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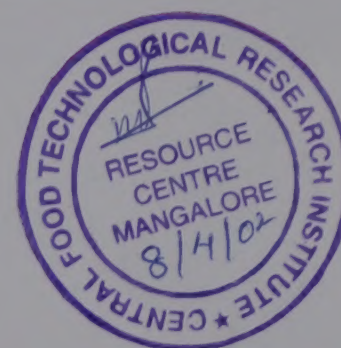
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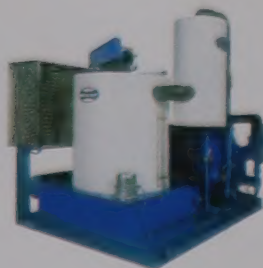
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Culture and Breeding of Discus-A Valuable Ornamental Fish

Introduction

The discus or the pompadour fish belongs to the genus *Symphysodon* of the family Cichlidae. The fish originated from South America and are found over a large area of the Amazon river. There are two species of Discus, *Symphysodon aequifasciata* and *Symphysodon discus*. The latter is characterized by three wide prominent vertical dark bands, one on the centre of its body, one across the face (through the eye) and one across the caudal peduncle. The bands between these dark bands are usually much thinner and very faint. *Symphysodon aequifasciata*, on the other hand, has eight uniformly wide dark vertical bars. It is subdivided into three sub-species, *Symphysodon aequifasciata* (the Green discus) and *Symphysodon aequifasciata heridi* (the Blue Discus) and *Symphysodon aequifasciata axelrodi* (the Brown Discus).

Growing discus need minerals in the water and well water is said to be good for juvenile discus. Their temperature requirements (26 – 30°C) are higher than those of most tropical fish and a water pH of 6.0–6.4 is considered ideal for the better growth of the discus. Under optimum conditions, discus will live for 10–12 years. The ideal companions for discus in a community tank are a pair of corydoras catfish and cardinal tetras.

Selection of Breeding stock

The female discus will attain its

B.Ahilan¹ and S. Aunto Princy Vyla²

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sexual maturity at the age of 10–12 months and the male discus at the age of 14–15 months. When they are sexually mature the female usually select her own mate. The potential breeding pair will separate themselves from the other fish and settle down in a corner of the aquarium. They will then always stay together and defend their territory. The breeder fish should be fed regularly three times a day with live tubifex worms, blood worms and beef heart mixed with multi-vitamins.

At the time of spawning, she leads the male to the spawning site, and if there are other discus in the tank, she will keep away from them. With 10 to 12 breeders, one is assured of having atleast one mating pair. Once a pair is formed, they are transferred into another spawning tank. To minimize the risk of the eggs being eaten by the parents, it is best to select fish of atleast one and half years old. Larger mature fish tend to be more reliable in caring for the eggs and fry.

Spawning

A breeding tank measuring 60 cm x 60cm x 38cm is big enough for one breeding pair to build their nest in. A piece of PVC plastic pipe of 10 cm

diameter and 20cm height or an inverted flowerpot, can be placed in the tank as a spawning substrate. Water pH should be between 6.0–6.5, water temperature between 28–29°C while water hardness should be about 46.2mg/l CaCO₃. Once the pair has chosen a particular spawning site, the female fish carefully starts cleaning the site. Occasionally, the female will swim towards the male, bow and return to continue the cleaning. The cleaning process is a sure sign that spawning is imminent. The cleaning of the spawning site will normally take several hours or perhaps a whole day. As the activity around the spawning site becomes more vigorous, it should become possible to distinguish the sexes. In the male, the breeding tube is smaller, shorter and pointed, while in the female, the breeding tube is thicker, blunt and projected further from the body.

After a number of "trial runs", the female swim towards the spawning site and lays one egg after another, she will deposit an average of 10–20 eggs in a single row. After the female has laid the eggs, the male will swim over them, depositing his sperm over the eggs. The sequence of events will take about

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2 - 3 hours. The number of eggs will depend on the age and condition of the female; there may be as few as 30 or as many as 500, but the average seems to be around 200. Depending on the temperature and other water conditions, the eggs take 50 to 60 hours to develop. Hatching during darkness would be fatal for all of the offspring, because the parents would not be able to gather them together.

If the water conditions are unsatisfactory for the brood, the larvae will die. Satisfactory water parameters for the healthy and satisfactory development of the brood are the following: pH 5.0 - 6.0, water temperatures of 28 - 29" C, low concentrations of germs, and very low nitrite and nitrate values. A full-fledged little discus (fry) can be seen in the water usually five to six days after fertilization.

Caring for the fry

At water temperature of 28 - 29" C, the eggs will hatch after about 52 - 54 hours. During the hatching period, the parents will be fanning the eggs, as well as picking off the dirt and eating any eggs that do not develop properly. When the eggs have hatched, the parents suck the larvae out of their eggshells. The larvae can be seen wriggling in a great black mass attached to the spawning site. Sometimes a larva wriggles itself free of the spawning site and is usually picked up by one of the parents before it reaches the bottom of the aquarium. Sometimes the larvae are moved to another site by the parent fish. This is a protective measure against any predation. During this period, they obtain their nourishment from their yolk sac.

Seventy two hours (depending on the water temperature) after spawning, the fry become free swimming. They will swim aimlessly about the tank. Within an hour, all the fry can be seen grazing near the sides of the parents. They are eating the slime secretion

from the parent's body. The slime secretion is vital to the young fishes for atleast 4 - 5 days and they will not take any other food. Newly hatched brine shrimp can be introduced to the fry after 5 — 6 days. Brine shrimp should be given as often as possible and it is better to give small quantities at a time.

The young discus are left with the parents for approximately 2 - 3 weeks. Thereafter they can be moved to another tank. At this stage water exchange should be done at a rate of about 20 percent daily. Tap water that has been aged overnight is most commonly used. Feeding the fish with newly hatched brine shrimp will frequently lead to rapid and healthy growth. To ensure good colour strains and uniform size, regular grading of the fry into different sizes is necessary.

Feeding

The fry can be fed with egg yolk paste smeared in a thin strip around the rim of the tank. After four days, supplementary feeding of freshly hatched brine shrimp should be started. Fry which have fed heavily on brine shrimp naupli or formula feed tend to be lazy and will just lie on the bottom. The gentle flow of water through the feeding tank helps keep fry swimming. A good feeding programme is very important during the first year of a Discus. For the first six months, they can be fed 5 times daily with live brine shrimp and supplementary feed. After six months, feeding can be reduced to twice a day. Apart from the formula feed for discus, live feed like bloodworm, tubifex worms, earthworms, brine shrimp and even frozen and freeze dried worm meals can be used.

Conclusion

In the culture and breeding of discus, the water quality management is to be given great attention to ensure healthy discus. Suitable food, adequate lighting, proper aeration and gravel filtrations have to be provided for the

better growth of the discus. Discus, which command higher prices in the international markets, can bring much needed foreign exchange for India if entrepreneurs take up its culture and export on an intensive scale.

JAPAN MULLS CREATION OF NEW FOOD SAFETY AGENCY JAPAN RESPONDS TO EU FOOD SAFETY CRISES

Japan's ruling Liberal Democratic Party (LDP) is said to be mulling setting up a few food safety agency by merging the divisions of the farm and health ministries which are currently attempting to combat mad cow disease.

The move comes in response to a fact-finding mission to Europe last month, during the course of which ministers learned that several EU governments have responded to the string of food safety crises of latter years by reorganising their ministries and agencies.

A panel set up by the Ministry of Agriculture, Forestry and Fisheries and the Ministry of Health, Labour and Welfare to study the administrative problems that led to the spread of the mad cow disease is also recommending a new food safety agency.

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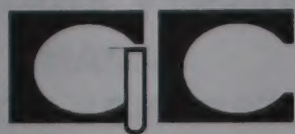
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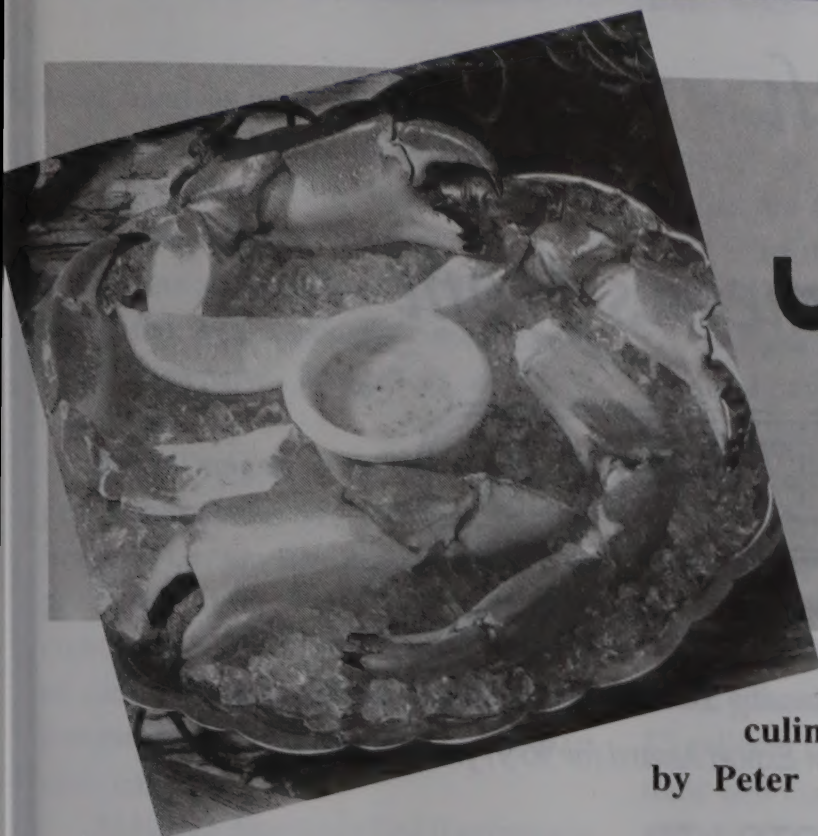
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Jonah, rock crab

Two crabs that were once discarded have become culinary darlings of four-star chefs from coast to coast

by Peter Redmayne

Dungeness crab may be sweeter and king crab more impressive, but it's unlikely that any crabs are more profitable than Jonah and rock (a.k.a. "peekytoe") crab, two low-priced species that are increasingly showing up on some very high-priced menus.

Guests who dine at the trendy Swan Restaurant in the Inverness Hotel and Golf Club at the foot of the Rocky Mountains near Denver, for example, can dig into a Jonah Crab Tower, the creation of Executive Chef Daniel Block.

The appetizer, which Block describes as "Jonah crab combined with herbs, onions and spices layered with chervil crisp, on a cucumber pepper slaw with shallot black pepper vinaigrette," sells for \$12.

And it's not that Block is anything but discerning about his seafood. Block, who graduated at the top of his class at the Culinary Institute of America, was Texas Seafood Chef of the year in 1994, when he was executive chef at La Mansion del Rio Hotel in San Antonio.

Meanwhile, at Le Bernardin, the Big Apple's cathedral of haute seafood cuisine, guests can ponder Peekytoe Crab Salad, Verbena-Tomato Water Gelee and Gazpacho "Martini" after they finish their Progressive Tasting of

Marinated Fluke.

In the Windy City, Executive Chef Paul Wildermuth uses Jonah crab meat in crab cakes, crab fried rice, salads and even crab egg-drop soup at Red Light, his Pan Asian restaurant.

"I'm a huge fan of Jonah crab," he says. "I've used snow, king and Dungeness, but Jonah works the best. It has a nice, neutral flavor that takes on my flavors really well, and the price is nice."

It wasn't that long ago that Jonah and rock crabs were nothing more than a nuisance. Lobstermen off New England and the Canadian Maritimes routinely would toss them back when they came up in their trays, sometimes stabbing them with a screwdriver to get rid of the pests, which competed with lobsters for bait.

Over the past 10 years or so, though, as demand for an alternative to more established - and expensive - crabmeat has grown, fishermen have found they can make a few extra bucks on Jonah and rock crabs, as a limited number of processors will pay them 50 cents a pound or so, making it worthwhile to hang onto the crabby bycatch.

Smaller than Jonahs, rock crabs are caught mainly in the summer by inshore

fishermen, while Jonahs are landed year-round by both inshore and off-shore lobster boats.

Although still small compared to landings of other crabs, U.S. landings of Jonah and rock crab have almost doubled since 1995, from 1,700 metric tons to almost 3,000 metric tons.

Jeff Holden was one of the first processors to buy Jonah and rock crabs. His company, Portland Shellfish in Portland, Maine, is now the largest crabmeat processor in New England.

"It's taken time to develop the market," he says, "but prices have steadily inched up as demand has grown."

Like other Jonah and rock crab processors, Holden sells both fresh and frozen rock and Jonah crabmeat and scored Jonah claws (the claws from the rock crab are too small).

Depending on the ratio of leg to body meat, fresh crabmeat will sell to distributors for anywhere from \$7 to \$10 a pound, while frozen crabmeat runs about \$5 to \$7 a pound.

The meat from the two crabs can be used interchangeably, says Holden. Meat from rock crab, though, has more brownish-red highlights, similar to meat from a Dungeness. Jonah meat, on the

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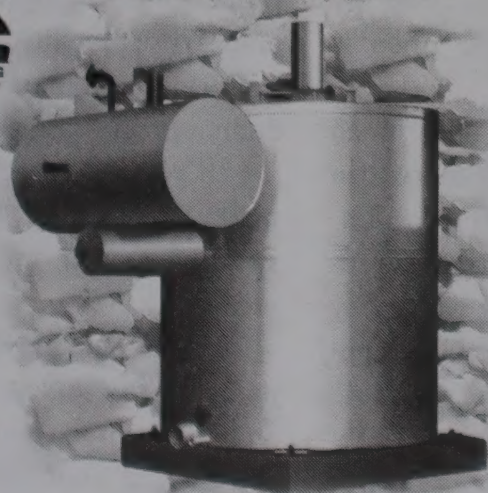
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other hand, is more white, he says.

Although more cutting-edge chefs are using meat from Jonah and rock crabs, the biggest market is still to processors and food manufacturers who blend the less expensive meat with more expensive Dungeness or blue-crab meat.

When Dungeness meat, for example, gets much above \$18 a pound, Pacific Seafood Group, the largest Dungeness processor on the West Coast, finds that customers switch to a blended product of rock and Dungeness meat, so they can meet their price points on items like crab cakes.

Although diners can find it extremely difficult to discern the difference, the bean counters can, since the blended product sells for about 33 percent less.

Jonah-crab meat is very popular with crab-cake manufacturers on the East Coast, says Tim Massey, who bought a shrimp-processing plant in Bristol, Maine, in 1997 after he sold his Caribbean fleet of sword and tuna longliners.

Massey invested about \$1 million to upgrade the plant, which is now equipped with a mechanical meat extraction line and liquid nitrogen freezers.

"When I bought the plant, I had to identify something other than shrimp to justify it. Crab was one of the few things around where there was a consistent supply and price for almost 12 months a year," says Massey.

Today, his company, Thomas Massey Ltd., typically processes about 15,000 pounds of Jonah and rock crab a day, six days a week.

In addition to meat, Jonah crab processors sell a lot of scored, frozen, cooked claws. At prices less than \$3.50 a pound for 6-C) count claws, they're a low-cost alternative to stone crab or snow crab claws, which can run more than twice as much. Massey says the claws are very popular in seafood buffets in places like Las Vegas and Florida.

"They're a great value for the operators," he says, "they're crab, but they're not too easy to eat, so people can't scarf them up."

Canada's catch

In Canada, Jonah and rock crab landings have increased from approximately 7,500 metric tons to 10,500 metric tons over the past five years.

Not surprisingly, Nova Scotia's Clearwater Fine Foods, Canada's largest lobster company, is also Canada's largest processor of Jonah crab. In 2000, Clearwater reportedly sold about \$5 million (US) worth of Jonah crab meat and claws. And it would like to sell more.

Last spring, Clearwater, now owned by Fishery Products International, entered into an agreement with the Membertou band of the Mi'kmaq Indians to explore the feasibility of an offshore directed fishery for Jonah crabs.

New England crab processors would like to find more crab to meet the growing demand, too, but that's probably not going to happen for a while.

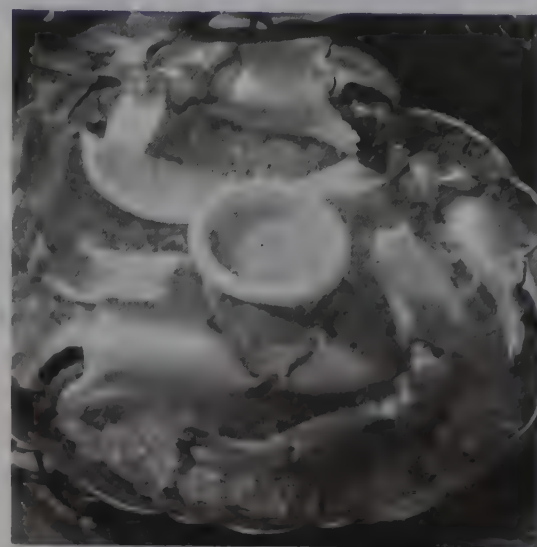
"The business has pretty much leveled out because of lack of supply," says Holden.

Massey says he would like to see lobstermen stay on the water in the winter and target Jonah crabs, which he thinks they could catch in decent quantities.

"There are plenty of crabs out there, but the lobstermen have done real well the past few years, so they can afford to tie up for the winter."

As long as demand keeps growing, don't be surprised if the cost to make a Jonah crab cake or a peekytoe salad edges up a bit. But don't feel sorry for the four-star chefs who have put these crabs on the culinary map.

Anytime you can sell \$1 worth of crabmeat for \$10 and up, that's still a very welcome addition to the bottom line.



Jonah crab at a glance

What does it look like?

Jonah crabs are oval-shaped like Dungeness crabs, but with bigger claws. They have reddish shells and white undersides. Raw meat is translucent white; cooked meat is white with brownish-red highlights.

What does it taste like?

Jonah crab meat is flaky and sweet, often compared to Dungeness or stone crab, though it's darker and heavier in texture than Dungeness.

How do you cook it?

Jonah crab can be used in almost any recipe that calls for crab meat, including soups, stews, dips, stuffings and crab puffs and cakes. Large Jonahs make a fine cracked-crab entree served with butter, lemon and herbs. To cook live crabs, place in boiling salted or seawater and cook for about 6 minutes per pound. When the crab has cooled, meat can be extracted from the legs and body.

Primary product forms

Live

Fresh: Whole, cooked; meat (also pasteurized); cocktail claws; snap-neat claws

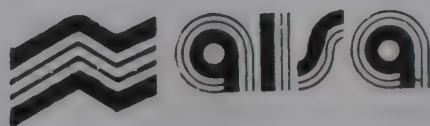
Frozen: Whole, cooked; meat (pasteurized); minced meat; whole claw and arm; cocktail claws; Snap-n-eat claws.

Substitutions

Dungeness crab

Stone crab

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All of which will see Alsa netting more profits and precious foreign exchange from the seas.



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BRINGING ASHORE THE PROSPERITY OF THE SEAS.

Hazard Analysis and Critical Control Point (HACCP)

System and Guidelines for its Application

Preamble

The first section of this document sets out the principles of the Hazard Analysis and Critical Control Point (HACCP) system adopted by the Codex Alimentarius Commission. The second section provides general guidance for the application of the system while recognizing that the details of application may vary depending on the circumstances of the food operation.¹

The HACCP system, which is science based and systematic, identifies specific hazards and measures for their control to ensure the safety of food. HACCP is a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end-product testing. Any HACCP system is capable of accommodating change, such as advances in equipment design, processing procedures or technological developments.

HACCP can be applied throughout the food chain from primary production to final consumption and its implementation should be guided by scientific evidence of risks to human health. As well as enhancing food safety, implementation of HACCP can provide other significant benefits. In addition, the application of HACCP systems can aid inspection by regulatory authorities and promote international trade by increasing confidence in food safety.

The successful application of

HACCP requires the full commitment and involvement of management and the work force. It also requires a multidisciplinary approach; this multidisciplinary approach should include, when appropriate, expertise in agronomy, veterinary health, production, microbiology, medicine, public health, food technology, environmental health, chemistry and engineering, according to the particular study. The application of HACCP is compatible with the implementation of quality management systems, such as the ISO 9000 series, and is the system of choice in the management of food safety within such systems.

While the application of HACCP to food safety was considered here, the concept can be applied to other aspects of food quality.

Definitions

Control (verb): To take all necessary actions to ensure and maintain compliance with criteria established in the

HACCP plan.

Control (noun): The state wherein correct procedures are being followed and criteria are being met.

Control measure: Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Corrective action: Any action to be taken when the results of monitoring at the CCP indicate a loss of control.

Critical Control Point (CCP): A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Critical limit: A criterion which separates acceptability from unacceptability.

Deviation: Failure to meet a critical limit.

Flow diagram: A systematic representation of the sequence of steps or operations used in the production or manufacture of a particular food item.

HACCP: A system which identifies, evaluates, and controls hazards which are significant for food safety.

HACCP Plan: A document prepared in accordance with the principles of HACCP to ensure control of hazards which are significant for food safety in the segment of the food chain under consideration.

¹ The Principles of the HACCP System set the basis for the requirements for the application of HACCP, while the Guidelines for the Application provide general guidance for practical application.

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Hazard: A biological, chemical or physical agent in, or condition of food with the potential to cause and adverse health effect.

Hazard analysis: The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.

Monitor: The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control.

Step: A point, procedure, operation or stage in the food chain including raw materials, from primary production to final consumption.

Validation: Obtaining evidence that the elements of the HACCP plan are effective.

Verification: The application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan.

Principles of the HACCP System

The HACCP system consists of the following seven principles:

Principle 1

Conduct a hazard analysis.

Principle 2

Determine the Critical Control Points (CCPs).

Principle 3

Establish critical limit(s).

Principle 4

Establish a system to monitor control of the CCP.

Principle 5

Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.

Principle 6

Establish procedures for verifica-

tion to confirm that the HACCP system is working effectively.

Principle 7

Establish documentation concerning all procedures and records appropriate to these principles and their application.

Guidelines for the application of the HACCP System

Prior to application of HACCP to any sector of the food chain, that sector should be operating according to the Codex General Principles of Food Hygiene, the appropriate Codex Codes of Practice, and appropriate food safety legislation. Management commitment is necessary for implementation of an effective HACCP system. During hazard identification, evaluation, and subsequent operations in designing and applying HACCP systems, consideration must be given to the impact of raw materials, ingredients, food manufacturing practices, role of manufacturing processes to control hazards, likely end-use of the product, categories of consumers of concern, and epidemiological evidence relative to food safety.

The intent of the HACCP system is to focus control at CCPs. Redesign of the operation should be considered if a hazard which must be controlled is identified but no CCPs are found.

HACCP should be applied to each specific operation separately. CCPs identified in any given example in any Codex Code of Hygiene Practice might not be the only ones identified for a specific application or might be of a different nature.

The HACCP application should be reviewed and necessary changes made when any modification is made in the product, process, or any step.

It is important when applying HACCP to be flexible where appropriate, given the context of the application

taking into account the nature and the size of the operation.

Application

The application of HACCP principles consists of the following tasks as identified in the Logic Sequence for Application of HACCP (Diagram 1).

1. Assemble HACCP team

The food operation should assure that the appropriate product specific knowledge and expertise is available for the development of an effective HACCP plan. Optimally, this may be accomplished by assembling a multidisciplinary team. Where such expertise is not available on site, expert advice should be obtained from other sources. The scope of the HACCP plan should be identified. The scope should describe which segment of the food chain is involved and the general classes of hazards to be addressed (e.g. does it cover all classes of hazards or only selected classes).

2. Describe product

A full description of the product should be drawn up, including relevant safety information such as: composition, physical/chemical structure (including Aw, pH, etc.) microcidal/static treatments (heat-treatment, freezing, brining, smoking, etc.), packaging, durability and storage conditions and method of distribution.

3. Identify intended use

The intended use should be based on the expected uses of the product by the end user or consumer. In specific cases, vulnerable groups of the population, e.g. institutional feeding, may have to be considered.

4. Construct flow diagram

The flow diagram should be constructed by the HACCP team. The flow diagram should cover all steps in the operation. When applying HACCP to a given operation, consideration should

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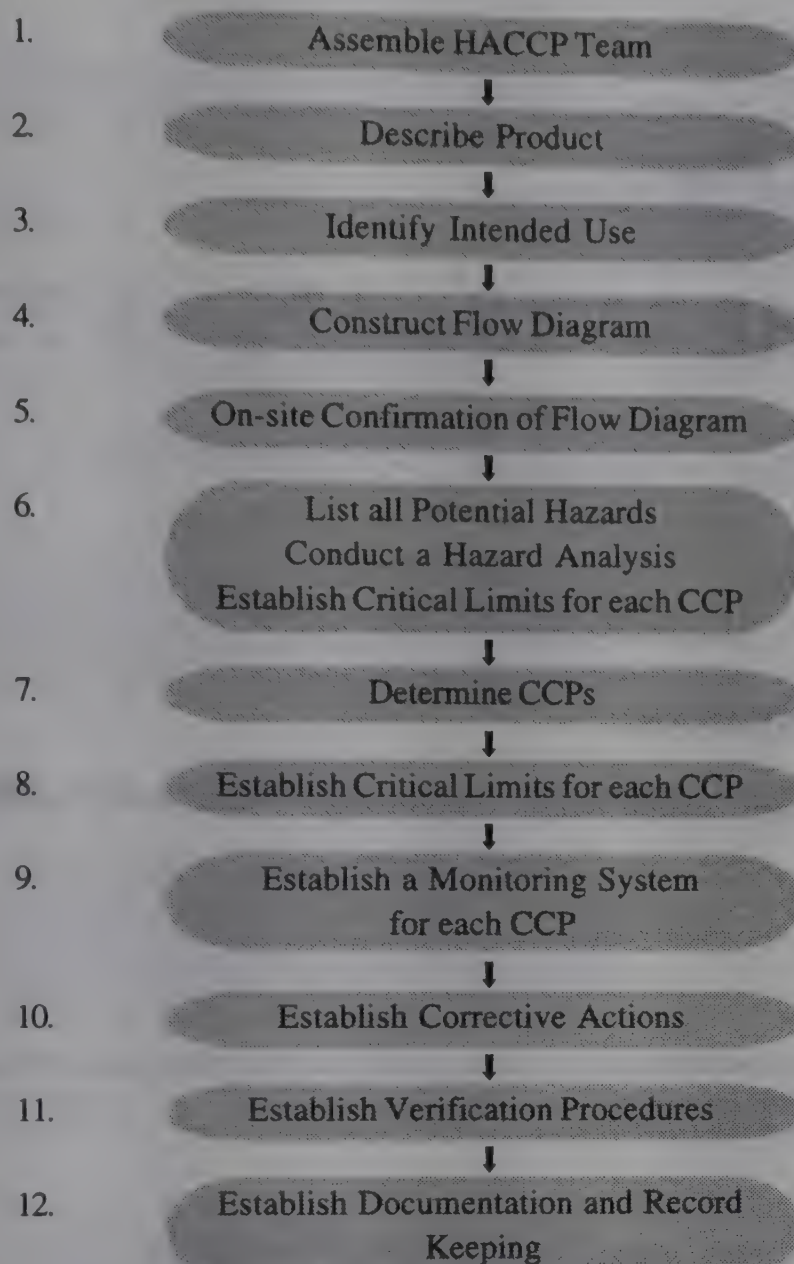
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Diagram 1
Logic Sequence for the application of HACCP



be given to steps preceding and following the specified operation.

5. On-site confirmation of flow diagram

The HACCP team should confirm the processing operation against the flow diagram during all stages and hours of operation and amend the flow diagram where appropriate.

6. List all potential hazards associated with each step, conduct a hazard analysis, and consider any measures to control identified hazards (See Principle 1)

The HACCP team should list all the hazards that may be reasonably expected to occur at each step from primary production, processing, manufacture and distribution until the point of consumption.

The HACCP team should next conduct a hazard analysis to identify for

the HACCP plan which hazards are of such a nature that their elimination or reduction to acceptable levels is essential to the production of a safe food.

In conducting the hazard analysis, wherever possible the following should be included:

- the likely occurrence of hazards and severity of their adverse health effects;
- the qualitative and/or quantitative evaluation of the presence of hazards;
- survival or multiplication of micro-organisms of concern;
- production or persistence in foods of toxins, chemicals or physical agents; and
- conditions leading to the above.


The HACCP team must then consider what control measures, if any, exist which can be applied for each hazard.

More than one control measure may be required to control a specific hazard(s) and more than one hazard may be controlled by a specified control measure.

7. Determine Critical Control Points (See Principle 2)²

There may be more than one CCP at which control is applied to address the same hazard. The determination of a CCP in the HACCP system can be facilitated by the application of a decision tree (e.g. Diagram 2), which indicates a logic reasoning approach. Application of a decision tree should be flexible, given whether the operation is for production, slaughter, processing, storage, distribution or other. It should

² Since the publication of the decision tree by Codex, its use has been implemented many times for training purposes. In many instances, while this tree has been useful to explain the logic and depth of understanding needed to determine CCPs, it is not specific to all food operations, e.g. slaughter, and therefore it should be used in conjunction with professional judgement, and modified in some cases.



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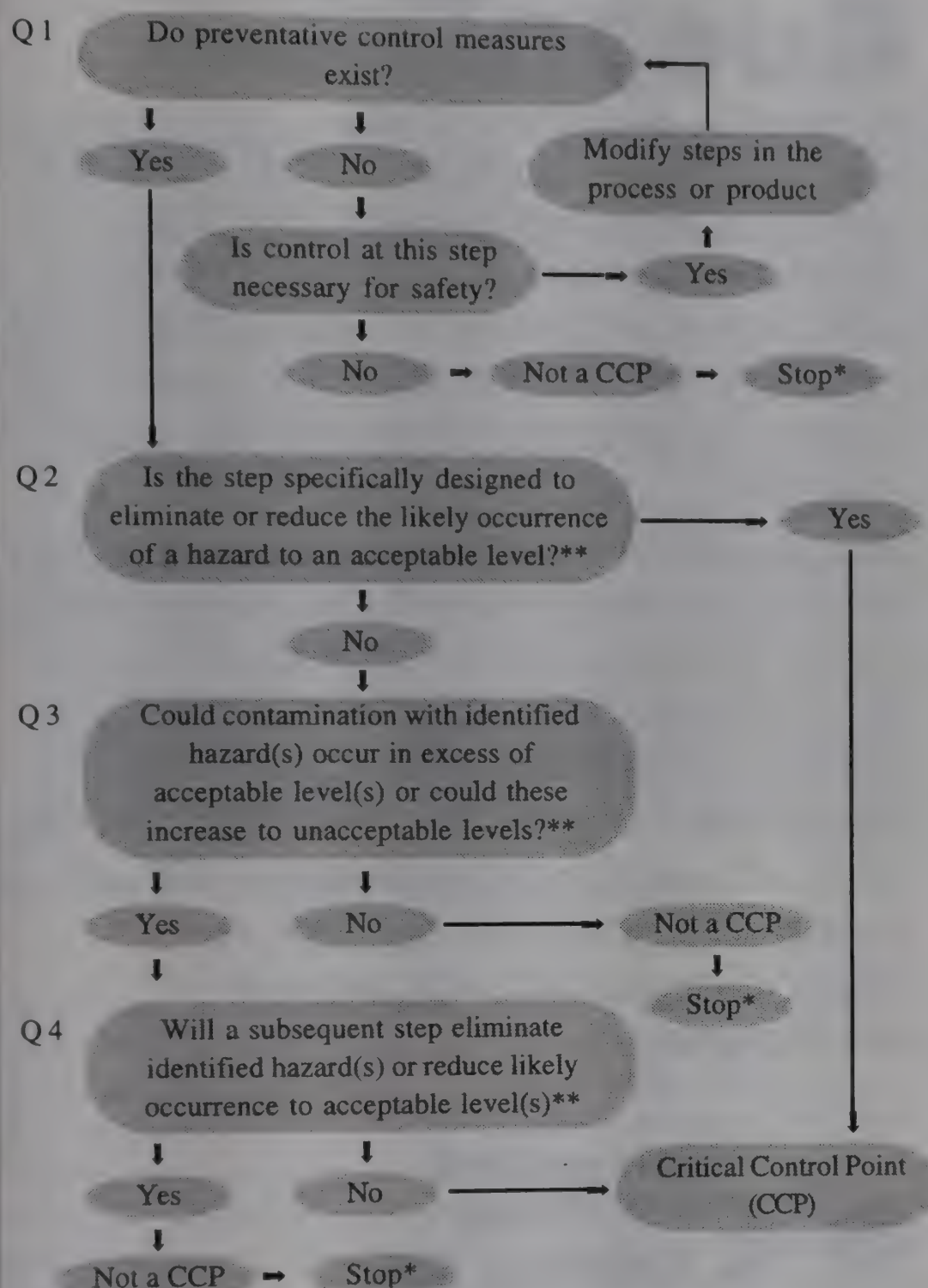
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Diagram 2
Example of Decision Tree to Identify CCPs
 (answer questions in sequence)



* Proceed to the next identified hazard in the described process

** Acceptable and unacceptable levels need to be determined within the overall objectives in identifying the CCPs of the HACCP plans

be used for guidance when determining CCPs. This example of a decision tree may not be applicable to all situations. Other approaches may be used. Training in the application of the decision tree is recommended.

If a hazard has been identified at a step where control is necessary for safety, and no control measure exists at that step, or any other, then the product or process should be modified at that step, or at any earlier or later stage,

to include a control measure.

8. Establish critical limits for each CCP

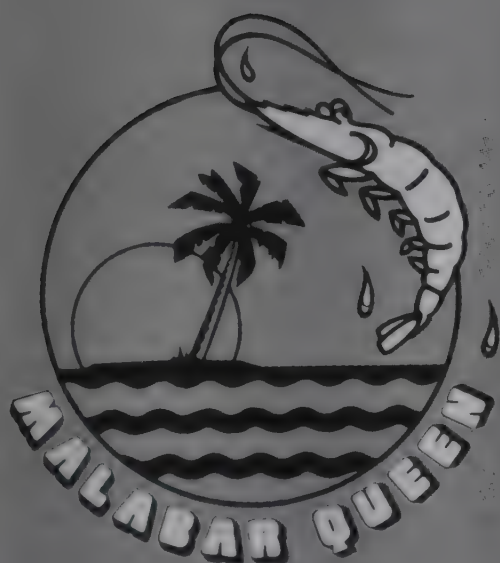
(See Principle 3)

Critical limits must be specified and validated if possible for each Critical Control Point. In some cases more than one critical limit will be elaborated at a particular step. Criteria often used include measurements of temperature, time, moisture level, pH, Aw, available chlorine, and sensory parameters such as visual appearance and texture.

9. Establish a monitoring system for each CCP

(See Principle 4)

Monitoring is the scheduled measurement or observation of a CCP relative to its critical limits. The monitoring procedures must be able to detect loss of control at the CCP. Further, monitoring should ideally provide this information in time to make adjustments to ensure control of the process to prevent violating the critical limits. Where possible, process adjustments should be made when monitoring results indicate a trend towards loss of control at a CCP. The adjustments should be taken before a deviation occurs. Data derived from monitoring must be evaluated by a designated person with knowledge and authority to carry out corrective actions when indicated. If monitoring is not continuous, then the amount or frequency of monitoring must be sufficient to guarantee the CCP is in control. Most monitoring procedures for CCPs will need to be done rapidly because they relate to on-line processes and there will not be time for lengthy analytical testing. Physical and chemical measurements are often preferred to microbiological control of the product. All records and documents associated with monitoring CCPs must be signed by the person(s) doing the



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1. Describe Product
2. Diagram Process Flow

[illegible]

4. Verification

12. Establish Documentation and Record Keeping (See Principle 7)

Documentation examples are:

- Hazard analysis;
- CCP determination;
- Critical limit determination.

- CCP monitoring activities;
- Deviations and associated corrective actions;
- Modifications to the HACCP system.

An example of a HACCP worksheet is attached as Diagram 3.

Training of personnel in industry, government and academia in HACCP principles and applications, and increasing awareness of consumers are essential elements for the effective implementation of HACCP. As an aid in developing specific training to support a HACCP plan, working instructions and procedures should be developed which define the tasks of the operating personnel to be stationed at each Critical Control Point.

Cooperation between primary producer, industry, trade groups, consumer organizations, and responsible authorities is of vital importance. Opportunities should be provided for the joint training of industry and control authorities to encourage and maintain a continuous dialogue and create a climate of understanding in the practical application of HACCP.

10. Establish corrective actions (See Principle 5)

The actions must ensure that the CCP has been brought under control. Actions taken must also include proper disposition of the affected product. Deviation and product disposition procedures must be documented in the HACCP record keeping.

Establish procedures for verifica-

- Review of the HACCP system and its records;
- Review of deviations and product dispositions;
- Confirmation that CCPs are kept under control.

Where possible, validation activities should include actions to confirm the efficacy of all elements of the



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Out with the fussy, in with familiar fare



Five food trends for 2002 and tips on how to capitalize on them
by Lisa Duchene

Comfort, family, home and simplicity will define the key food trends in 2002, following the terrorist attacks, war and recession that marked the latter part of 2001, say trend forecasters.

"On Sept. 11, the world changed, and along with it, the food we cooked and craved," wrote *Bon Appetit* magazine in its annual Top 10 food trends of 2001.

Fancy and expensive food is out. Food that is simple, familiar and represents good value is in.

Good news for the seafood industry: The magazine named scallops as Ingredient of the Year for 2002 because they can be elegant with minimal cooking effort.

The biggest change in the last six months, says Elizabeth Sloan, president of Sloan Trends and Solutions in Escondido, Calif., is that food has become more important in consumers' lives.

"[Consumers] are going to look to food for pleasure, for entertainment and for social aspects," says Sloan.

Here are five food trends for 2002 and some tips on how to capitalize on them.

Personalization. Efforts to personalize service, menu choices or product selections are good as long as they are genuine, says Phil Lempert, "Supermarket Guru" and food trends editor for NBC's Today show. "People want to connect with other people more than ever before," says Lempert.

Get out from behind the seafood

counter, talk to customers and sample product, suggests Lempert.

Orders with special requests are common in today's market, and restaurants must be flexible, says Marcia Schurer, president of Culinary Connections, a food consulting firm in Chicago. Seafood lends itself well to customizing a dish to customer preferences because it can be cooked by so many different methods and can be used in so many cuisines.

Eating at home. Research from The NPD Group, a consumer marketing research firm in New York, indicates more families are eating together at home. About 42 percent of American families dined at home together seven times a week in 2001 compared with 38 percent in 2000.

Eating at home means simple preparation, but retailers, processors and chefs can help consumers make meals special with ethnic flavors. Coconut shrimp, Phillips Foods' newest retail product, picks up on the Caribbean flavor trend. The shrimp is dipped in Coco Lopez's world-famous cream of coconut, then covered with coconut

shavings and is ready to bake or fry.

Takeout. Food to-go is still going strong, but growth of takeout at the casual, mid-scale segment is double that at quick-service restaurants. Operators who add takeout need to dedicate space and staff to make it convenient for consumers.

Point of origin. Interest in Americana and home-grown ingredients

is making a comeback, says Sloan.

"If there was ever a time for regional or local branding of seafood, it's now," she says. Imported fish is not necessarily a problem if it's merchandised as imported from the best source of high quality product, says Sloan.

Food safety. Anthrax outbreaks reminded American consumers of the possibility of a tainted food supply, says Lempert.

"Make sure the [seafood] counter is immaculate and keep in mind that food safety is a major concern for everybody," says Lempert.

Food safety is a high priority, but the fundamentals of how Americans eat won't change, say forecasters.

"People still need convenience. They're still working, now even longer hours," says Schurer.

"[Consumers] are not going to turn away from restaurants," says Linda Smithson, managing partner for FoodWatch, a consumer food trends firm in Minneapolis. "They're just going to find a place that fits their economic situation better."

Courtesy: Seafood Business

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- ❖ Dr. Jurgen Bischoff, Director, UNAPCTT (Asian and Pacific Centre for Transfer of Technology, New Delhi.
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- ❖ Mr. Michael Roberts, Agriculture and Commodities Division, WTO.

Apart from this, we would certainly have the privilege of having with us Indian experts as speakers, like the senior officials from all concerned Departments and Industry representatives. The participants are drawn from all over Europe, South East Asian Countries including India.

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An alternate method for thawing frozen shrimp to increase the quality in Seafood Industry

Sundaramanickam A., P. Soundarapandian, K.S. Prakash and T. Kannupandi
CAS in Marine Biology, Annamalai University Parangipettai

Introduction

The shrimps are economically important commodity among crustaceans. Of these black tiger, Indian white and brown shrimps are most valuable. Among the brown shrimps (*Metapenaeus monoceros*) are mostly used in value added product especially PTO (Peeled Tail On) products. The shrimps are caught in small fishing trawlers and motorboats finally are stored in ice. Subsequently within five days it will reach the processing unit. However in big trawlers the cached shrimps will reach the processing unit only after two to three months. In normal practice, the shrimps are separated and tied in nylon bags or plastic nets and stored in cold storage at -180 C. After reaching the processing plant frozen shrimps are thawed in rectangular tank with 5% sodium meta bisulphate solution. In this method, thawing duration extends 14 - 18 hrs. So it takes long time for melting and also black spot formation in shrimp is very high. Total heterotrophic bacterial count also increases while thawing and at the same time texture of the muscle are very tough after cooking. To avoid the above-mentioned problem an alternative method is proposed in the present paper.

1. Running water method

The melting machine is made up of stainless steel with three main parts.

The lower part with motor pump, the middle one is the water tank (50 liter capacity) and the upper part having six pipelines with a shower. The shower is connected to water tank with simple $\frac{1}{2}$ HP motor pump. In between the tank and the shower, a S.S plate with a drainage device is used for material keeping. The drained water is again connected in to the water tank, so the water will be circulated (fig - I)

Procedure

Fifty liter of 5% sodium meta bisulphate is prepared in the water tank. The frozen bags are kept in the middle plate and motor is switched on. The water from the tank pass through the pipeline which forcefully fall on the bag through shower. The force will be adjustable to avoid the damage of the shrimp in this type. Frozen shrimp will be melt 50kgs in 45 minutes.

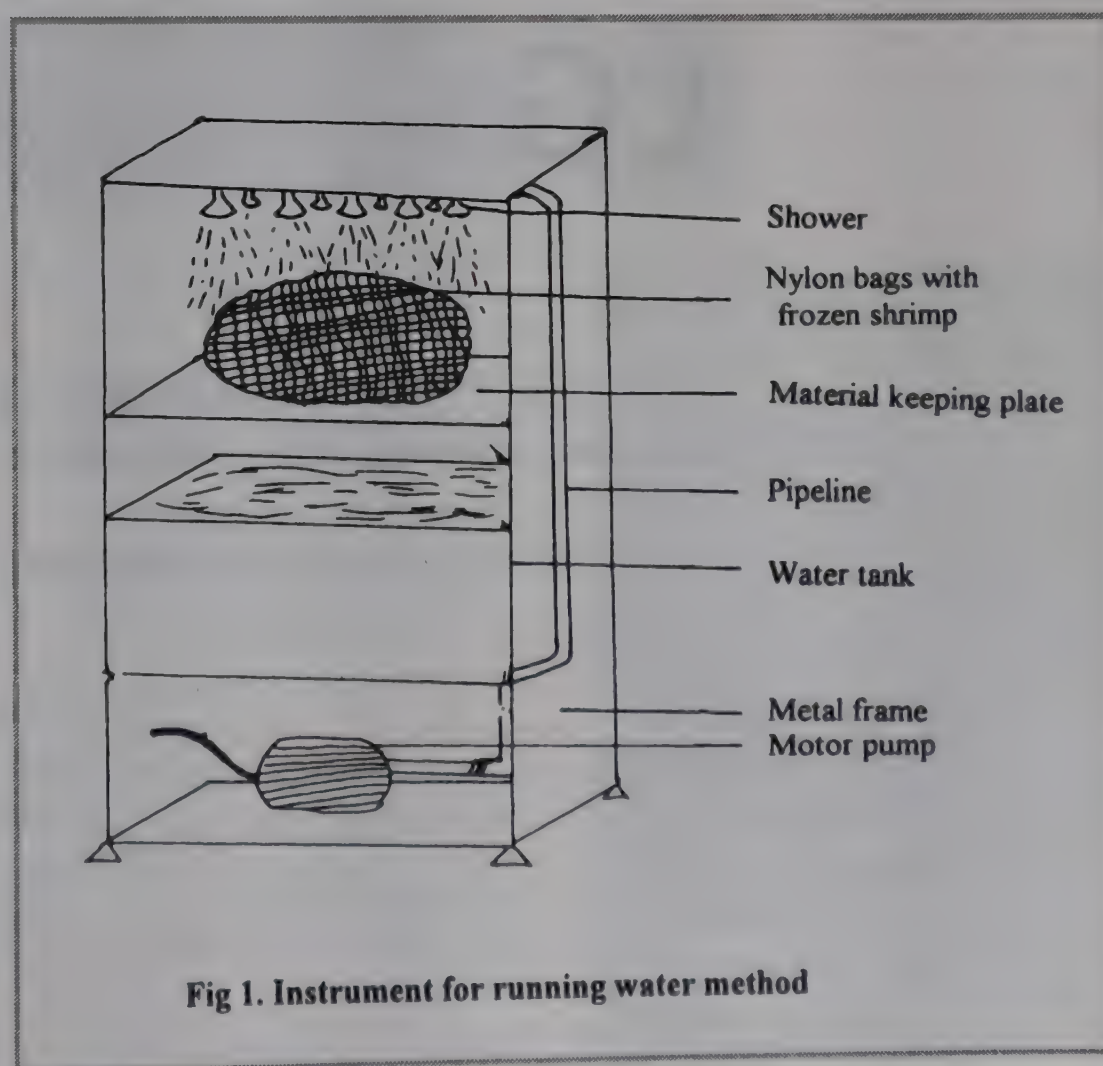


Fig 1. Instrument for running water method

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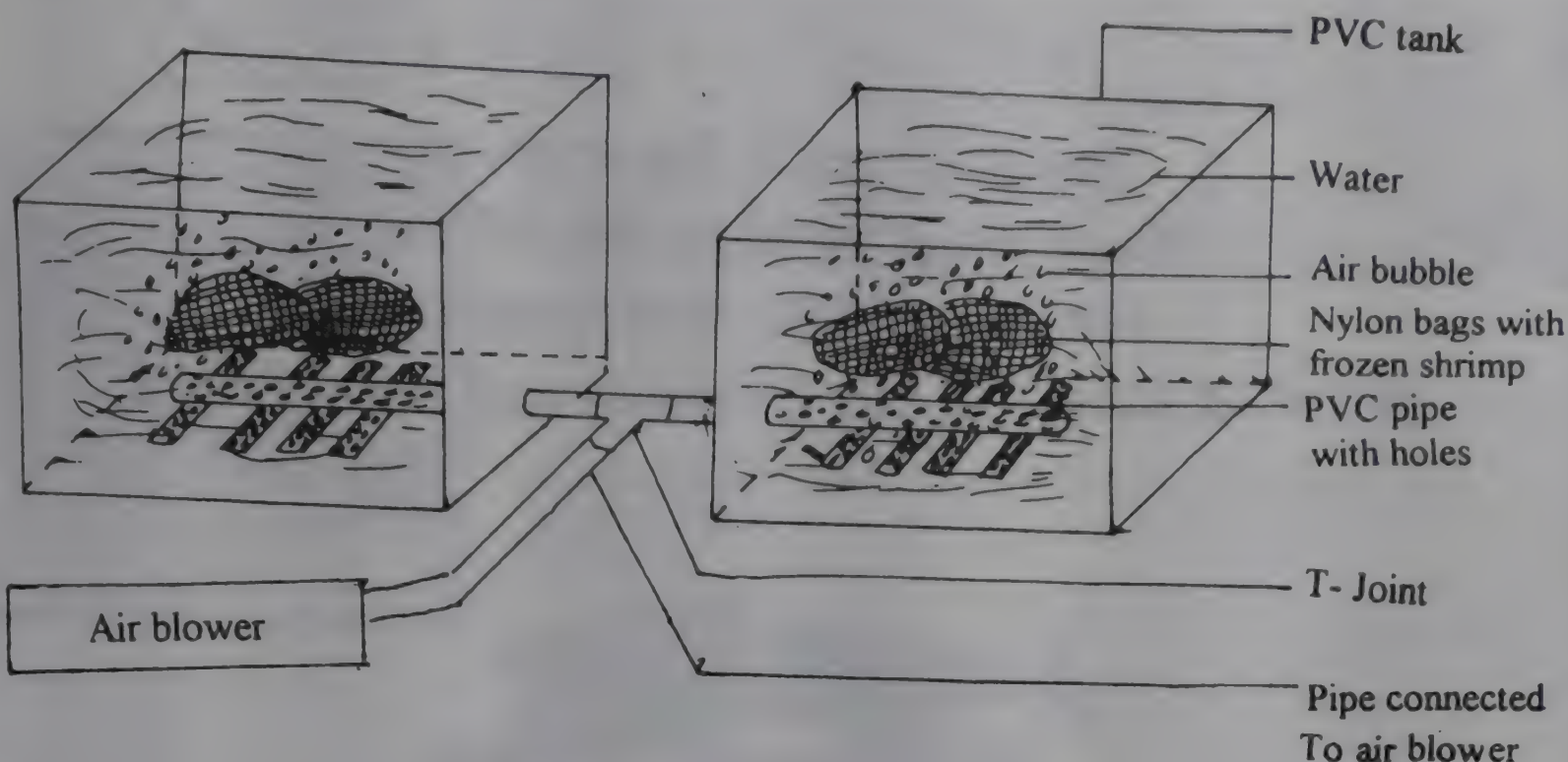


Fig 2. Instrument for aeration method

2. Aeration method

A rectangular tank (200 liter capacity) with a hole in the side of the bottom and $\frac{1}{2}$ " P.V.C pipe is inserted in to the tank, one end of the P.V.C pipe with numerous minute holes (depending on the requirement) the other end is connected with two or three tanks with the help of "T" or "+" joint. The entire set up is connected with air blower (fig - 2).

Procedure

100 litre of 5% sodium meta bisulphate solution is prepared in each tank and hundred kgs of frozen shrimp is kept in each tank and aerated with the help of Air blower. After 30 minutes the entire water in the tank is discarded and fresh solution is prepared and replaced. Because the temperature of the water decreases below 100 C, the thawing takes very long time. In order to avoid this problem water exchange is carried out. 200 kgs of shrimps estimated to be thawed within 90 minutes.

At the same time 1 percentage of black spot formation in the shrimp is analyzed by manual checking at random sampling. The total viable bacteria

count is performed by using Serial dilution technique with TGBE agar. Texture of the shrimp will be tested after boiling by tasting and sensory evolution. Sodium meta bisulphate content was tested by Shipton's method (modification of Monier-Williams method).

Merits

- The black spot (melanosis reaction) is more common in normal method. About 10-12 of the materials is the black spot formation. In running water method, the Mack spot formation is about 3-4%. However in the aeration method 4 -5% of the materials are formed with black spot.
- The TVC (Total viable count) in normal method is 8×10^4 to 1×10^5 . But in running water method the TVC count is 4×10^4 to 6×10^4 . Where as in aeration method the TVC count range between 6×10^4 to 7×10^4
- In normal method sodium meta bisulphate content ranges about 60ppm/gm. But in running water method it ranges 35 - 40 ppm/gm

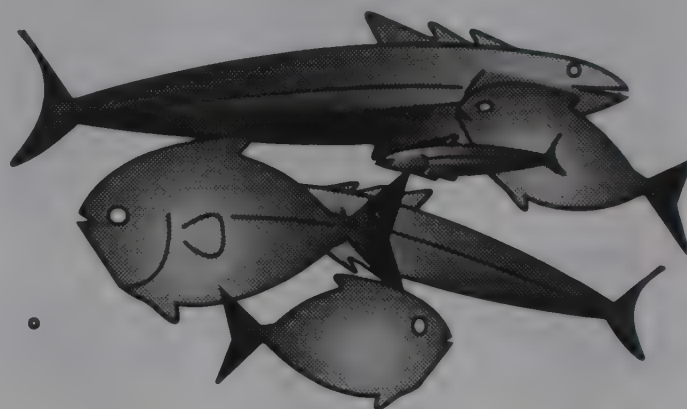
and in the aeration method it's around 35-50 ppm/gm.

- The texture of the shrimp is also good when compared to the normal method of thawing.
- The time duration for thawing is very less in these methods so we can reduce the spoilage of shrimp during processing.

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Seafood classics are back by popular demand



Fish dishes are among the comfort fare diners crave in stressful times
by Joan M. Lang

Classics were making a come back even before Sept. 11, but now, while the whole world seeks a retreat into comfort foods, they've become the stuff of craving. From fried catfish to poached salmon, traditional seafood preparations have never seemed more appropriate.

Whether freshened or presented proudly in traditional form, classic fish and shellfish dishes have been cropping up on menus all over the country. In some cases, they're even the basis for brand-new restaurants.

The Lobster Shack, Cambridge, Mass., and Uncasville, Conn., menus favorites like whole-belly Ipswich clams; cod cakes with baked beans; fish and chips; and a traditional Maine lobster roll.

Three Fish in Minneapolis serves Mediterranean tuna salad sandwich (with black olives, artichokes, roasted pepper, red onion, lemon and parsley); chilled poached salmon; and crab cakes with smoked red bell pepper butter.

The Lobster in Santa Monica, Calif., turns to regional favorites like crab cakes with fresh corn salad; Dungeness crab Louis salad; lobster club sandwich; and Louisiana prawns with dirty rice.

Familiar preparations encourage patrons to order unfamiliar products, including seafood. Only a New Englander would eat a steamer clam, for instance, but fry the same

clam and serve it with tartar sauce, and coleslaw, and you may have a hit on your hands. That's Kenny Bowers' thinking. The executive chef of Rockfish Seafood Grill in Dallas calls his menu "comfort seafood."

"It's food that people can relate to, and that helps sell the seafood," says Bowers. "One of our best-selling dishes is New England baked stuffed fish, topped with crabmeat and Ritz cracker crumbs — very traditional and comforting. Everyone knows what ravioli is; if I fill it with shrimp and lobster, they'll order it. You don't have to explain it to them the way you'd have to explain, say, a shellfish nage."

When Bowers tests a new dish, he starts with something familiar.

"I'm working on a shrimp parmigiana, for instance," he says.

At Bluewater Grill in California, seafood classics are the point of difference in a highly competitive, specialized market, says co-founder Jim Ulcik, whose first job was at a lobster pound in Maine.

"Out here, everyone's got an oyster bar and a wood grill for fish, but no one's bringing in the regional specialties and preparing them the way we do," says Ulcik.

In addition to the requisite oyster-and-grilled-fish basics, the three Bluewater Grills sport wide-ranging,

120-item menu touting everything from a Maine lobster roll on an authentic Nissen-style hot-dog roll (made to spec by a local baker) to walleye pike for the Midwesterners and even fried smelts.

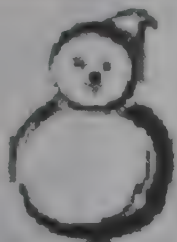
"Our top sellers are probably the same as just about anybody's," notes Ulcik, citing items like chowder, fish and chips and fried calamari. "But our signature dishes are what we're known for, like fried clams, baked, stuffed lobster and West Coast-style barbecued oysters." In fact, the classics tend to rule no matter where you look.

"In a place like Houston, you have to have things like fried catfish and oyster po' boys," says John Zotos, co-owner with brother Pete of St. Pete's Dancing Marlin, which has a second location in Dallas. So Delco's Catfish Platter, named after a friend from West Texas, features top-quality farm-raised fillets from Mississippi, dipped in seasoned cornmeal, then hash-fried in canola and served with French fries, slaw and hush puppies.

St. Pete's also does a land-office business in such favorites as fried oysters and shrimp (each made with a different cornmeal-based batter), seafood po' boy sandwiches, and grilled sashimi-grade tuna steak.

Whether in good times or bad, seafood classics are always a hit.

Courtesy: Seafood Business



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National Workshop on the Breeding, Farming, And Management of Ornamental Fishes



The National Workshop on The Breeding, Farming and Management of Ornamental Fishes conducted jointly by the School of Industrial Fisheries, Cochin University of Science and Technology and the Marine Products Export Development Authority, was held on 7th, 8th, and 9th of February 2002. The workshop was inaugurated by The Hon'ble Minister for Fisheries and Tourism, Prof. K.V.Thomas at 10 AM, at the Fine Arts Hall, Fine Arts Avenue, Cochin - 682 016. The Inaugural session was presided over by Prof. (Dr). N. Unnikrishnan Nair, Vice-Chancellor, Cochin University of Science and Technology. Dr. K. Devadasan, Director, CIET, Dr. Mohan Joseph Modayil Director, CMFRI, Sri K. Kunhi Mohammed, Joint Director MPEDA and Prof. @r) P.G. Kurup, Director, School of Marine Sciences, CUSAT, spoke on the occasion. Dr.A Ramachandran, Principal Investigator of the ornamental fish project presented a detailed report of the various achievements of the project being completed with the financial support of MPEDA.

The technical sessions were held in the Marine Sciences auditorium, Lake Side Campus, CUSAT. The sessions were chaired by Prof.(Dr) C.T. Samuel, former Director, School of Industrial Fisheries, Dr. A. Laxmi Narayana, Prof (Dr) N.R. Menon and Dr. T.K. Sreenivasa Gopal whose erudition and expertise in the respective fields are well known. Classes were conducted by scientists, academics and entrepreneurs with long and varied knowledge in all aspects of aquarium fish management and marketing. The topics included were Indigenous ornamental

fishes and their prospects for markets, Identification of important ornamental fishes, Design construction and setting up of aquaria, Marine ornamental fishes and their keeping, Breeding of freshwater ornamental fishes, Tank conditioning stocking and breeding of marine ornamentals, Species selection, compatibility, food and feeding of ornamental fishes, Water quality management, live feed organisms in ornamental fish culture, Common aquarium fish diseases and their treatment and Economics of indigenous ornamental fish collection, farming and marketing. The course structure of the workshop was specially designed to ensure a comprehensive and exclusive coverage of all aspects related to the ornamental fish trade and satisfied the requirements of all sections from lay hobbyists to those who wish to undertake the breeding, marketing and export of aquarium fishes and accessories. The registrations came from all over India and cover 12 states of the Union and all the districts of our state. The registered participants numbered around 250 included scientists, students, aquarium traders, breeders, farmers, entrepreneurs, exporters and ordinary house

wives who were already in the field or who wished to diversify their interests to this area. The workshop helped all those who wish to take up activities related to aquarium fish keeping as means either of self-employment or of additional income as also to those who were already in the trade to have a complete and authentic picture of all aspects of this industry.

The information disseminated in the workshop included the results of a detailed, two year long project conducted by Prof (Dr) A. Ramachandran, (School of Industrial Fisheries) and his team. . Special subjects of vital importance to those who wish to enter the business like Prospect and constraints in breeding and export, Procedures of starting an export unit, Packing transportation and export, export documentation procedures, financial assistance and schemes offered for ornamental fish farming or trading etc. were discussed by special invitees with wide and varied knowledge of these topics. A Compact Disc entitled "Ornamental fishes and their business in Kerala", prepared in the latest multi media format outlining a wide range of issues related to ornamental fishes and brief-

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ing the survey findings of the project was released by the Hon'ble minister during the inaugural session. CD will be available for sale.

The organizers are compiling all the lectures presented at the workshop along with other relevant information in the form of a book titled 'Breeding, Farming and Management of Ornamental Fishes'. The book is a comprehensive and authoritative collection and is of reference value to scientists, researchers, farmers, traders, exporters and householders alike. This will also be available for sale at a very early date. Those who wish to have a copy of CD and book may register their names with Prof. (Dr.) A. Ramachandran, Principal investigator, Project on Ornamental Fishes, School of Industrial Fisheries, CUSAT, Fine Arts Avenue, Cochin-16. Ph.No: (Off) 91-484-354711, (Resi) 91-484-360133. Fax: 91-484-365952. E-mail: ram-alappat@eth.net.

Training Course in Microbiology

The Central Institute of Fisheries Technology, Kochi is conducting a training programme on 'Laboratory Techniques for Microbiological Examination of Seafoods' from 15-04-2002 to 30-04-2002. Candidates wishing to join the course may send the application with bio data on or before 8th 2002. For further details contact Head, Extension, Information and Statistics Division, Central Institute of Fisheries Technology, Willingdon Island, Matsyapuri P.O., Cochin 29.

Annexure - I

Course Title:	Laboratory techniques for microbiological examination of seafoods
No. of participants:	Eight candidates per batch
Qualification:	Technologists, Microbiologists, Quality Control personnel in seafood industries with Bachelors Degree in Science, Fisheries or related fields
Duration:	14 working days from 15-04-2002 to 30-04-2002
Fee:	Rs. 3000 per candidate (The DD may be drawn in favour of the Director, CIFT, Cochin - 682 029)
Venue:	CIFT, Cochin - 29.

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Quality concept pays off

Fish International: Exhibitors very satisfied

Visitor quality was higher than ever before", is the balance drawn by Peter Koch-Bodes and Hans Peter Schneider, both Managing Directors of fair organizer MGH. Professionals from 80 different countries used the four-day event from 14 to 17 February to inspect the products and services presented by 508 exhibitors at the fish fair. "Exhibitors from 51 different countries, and 19 national and regional pavilions... that's something we can be really satisfied with", says Koch-Bodes happily. "Our concept of making quality the focus of the fair paid off in every way.

The response of visitors from industry, wholesaling, food retailing, and catering was extremely good on all four days of the fair. Wholesaler 'Metro' registered 3,500 customer contacts at the exhibition. "By demonstrating our competence as fish suppliers we succeeded in addressing a lot of new customers who had so far not been familiar with the Metro product range", commented Rolf-Gunther Wannink, the Go-Managing Director of all 44 Metro stores with their own fish departments. Reinhold Lauber, the Marketing Manager of Deutsche See, also drew a positive balance: "We can see how important it is to be present at this fair from the depth of discussions held with customers and colleagues as well as



Seafood delicatessen: Caviar, opah, white herring or lobster - 508 exhibitors from 51 different countries presented their products at the *fish international* in Bremen for the full scope of the value adding chain.

from the value of addressing potential new customers." 'fish international' was this year again an absolute success for Deutsche See.

Quality concepts, environmental compatibility, and new products were the central themes of the international trade fair which took place for the eighth time this year at the Bremen Fair Center. Exemplary here: arapaima, a freshwater fish that was presented in Europe for the first time. It is farmed by an association of small farmers from Peru as part of a socio-environmental project. 10 importers from France, Spain, Italy, Great Britain, Romania and Germany showed immediate interest in this tasty fish from the Amazon.

Products from Eastern Europe captured visitor interest, too: an Estonian producer successfully concluded a contract for one million jars of rollmops which will soon be on sale at Austrian

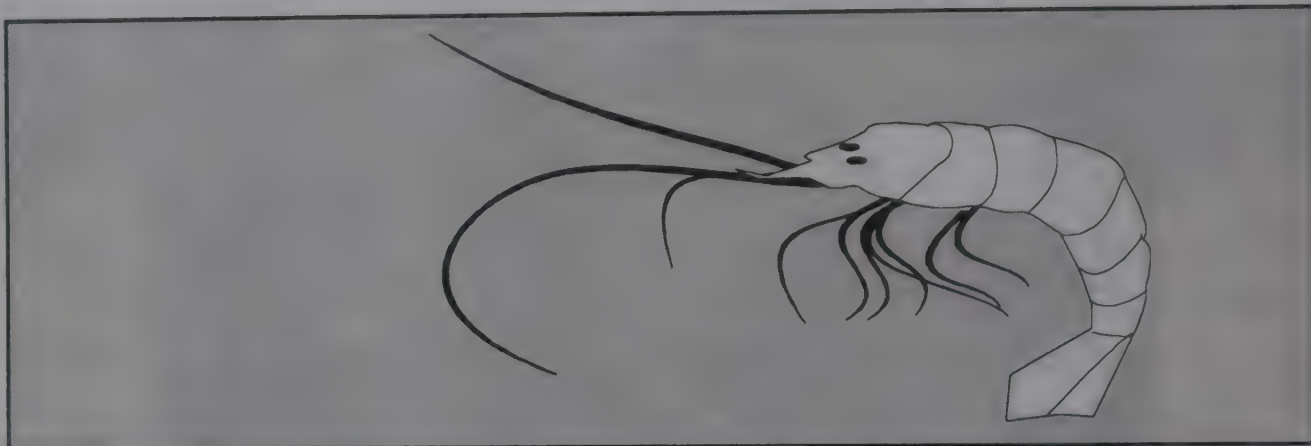
retailers'. A particularly large number of exhibitors and visitors from Eastern Europe again used the fair to make business contacts with Western European firms. They met at the EASTFISH Trade Point which is organized by the Food and Agriculture Organization (FAO) in cooperation with the Swiss development project SIPPO.

Another fair innovation: the use of robots for fish processing. Sophisticated sensors and image recog-

nition have for the first time enabled a robot to recognize a fish, pick it up and place it accurately into a polystyrene box overlapping if required. The necessary know-how comes from an association of 12 firms, among them PS-Systempack, Sealpac, Bosch Rexroth, Omron Electronics, Kawasaki and Toshiba. Nigel Smith, the manager of Toshiba in Europe, and Tom Suto, the European President of Kawasaki Robotic, were both enthusiastic about the processing line during their visit to the fair.

Producer Hussmann & Hahn was very satisfied, too. "The response to our products, as to the presentation of our newly developed fresh fish segment was excellent. All the major buying offices from the German grocery sector were there", reported Sales Manager Rene Stahlhofen. This was confirmed by Manager Jurgen Pauly from Seefisch Vertriebsgesellschaft in Bremerhaven: "The high quality of visi-

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Trade point fish: Visitor quality was higher than ever before, is the balance drawn by Peter Koch-Bodes and Hans Peter Schneider, both Managing Directors of fair organizer MGH. Professionals from 80 different countries used the four-day-event to inspect the products and services presented by 508 exhibitors at the fish fair.



Quality in Bremen: Based on the motto "The Quality Exhibition", buyers and sellers from more than 70 countries all over the world met at the fish international. Quality concepts, environmental compatibility and new products were the central themes of the international trade, taking place in Bremen for the 8. time.

tors throughout all visitor groups, but particularly from the grocery sector, exceeded all our expectations." And, high praise from Dutch exhibitors, too, for example Hanny Oosterbaan, the Manager of Noordzee Breskens: "The contacts here are invaluable.

The fair was rounded off by a professional programme of events. A particular highlight this year was the 'Quality Conference'. Together with partner organizations such as the Marine Stewardship Council (MSC) and the associations of the fish industry, exhibitors and visitors discussed issues relating to quality assurance, certification and sustainable fisheries. The FAO Sub-Committee on Fish Trade, which met in Bremen parallel to the fair, also focused on these topics. "Thanks to the support of our exhibitors, fish industry associations, and partner organizations like the FAO, we were able to fully meet the claim made in the fair's subtitle, 'The Quality Exhibition'", sums up Hans Peter Schneider, Managing Director of MGH.

NEWS & NOTES

CHLORAMPHENICOL ISSUE- DEVELOP- MENTS IN USA

The US FDA has issued Import Alert # 16-124, which calls for "Detention without physical examination of aquaculture Products" due to unapproved drugs. Consequently, the FDA has stepped up its inspection for residues of Chloramphenicol not only on the imports from China but also from other countries.

The Consumer Advocacy Group Inc; based in Inglewood, California has warned 18 firms that it intended to sue them for selling in California imported shrimp containing the banned antibiotics - Chloramphenicol- and failing to

label their products under "The Safe Drinking water and Toxic Enforcement Act 1986" better known as "Proposition 65".

US CATFISH FARMERS SWITCHING OVER TO SCAMPI CULTURE

US catfish farmers are passing through bad times. Due to various problems - low prices, increased competition from exports, and need to grow the fish to bigger sizes to satisfy the processor-more than 25 % of the farmers are expected to close sell out their farms this year. Several others are trying to switch over to culture of scampi (*Machrobrachium rosenbergii*) in their farms.



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Executive Director

Tel.:(Resi.) : 0251-326624

Pager No. : 9628-215296

Drugs Approved for Use in Aquaculture (Poikilothermic Food Species)

Drug	Species	Indication	Dosage regimen	Limitations/Comments
Chorionic Gonadotropin, (Chorulon® by et, Inc.)	Male and female brood finfish	Aid in improving spawning function Aid in improving spawning function	50 to 510 IU/lb males 67 to 1816 IU/lb females	Up to three doses. Total dose not to exceed 25,000 IU in fish intended for human consumption
Oxytetracycline monoalkyl trimethyl ammonium (Terramycin® by Pfizer, Inc.)	Pacific salmon	Mark skeletal tissue	250 mg/kg/day for 4 days	- Salmon < 30 g. In feed as sole ration - 7 day withdrawal time. Also hydrochloride form
	Salmonids	Control ulcer disease furunculosis, bacterial hemorrhagic septicemia, and pseudomonas disease, (<i>Hemophilus piscium</i> , <i>Aeromonas salmonicida</i> , <i>A. liquefaciens</i> , <i>Pseudomonas</i>)	2.5 to 3.75 g/100 lb/day for 10 days	- In mixed ration - Water temperature not below 48.2° F - 21 day withdrawal time
	Catfish	Control bacterial hemorrhagic septicemia and pseudomonas disease (<i>A. liquefaciens</i> , <i>Pseudomonas</i>)	2.5 to 3.75 g/100 lb/day for 10 days	- In mixed ration - Water temperature not below 62° F - 21 day withdrawal time
	Lobster	Control gaffkemia (<i>Aerococcus viridans</i>)	1 g/lb medicated feed for 5 days	- In feed as sole ration - 30 day withdrawal time
Sulfadimethoxine, ormetoprim (Romet-30® by Roche Vitamins, Inc.)	Salmonids	Control furunculosis (<i>Aeromonas salmonicida</i>)	50 mg/kg/days for 5 days	- In feed - 42 day withdrawal time
	Catfish	Control enteric septicemia (<i>Edwardsiella ictaluri</i>)	50 mg/kg/days for 5 days	- In feed - 3 day withdrawal time
Tricaine methanesulfonate	Fish (Ictaluridae, Salmonidae, Esocidae, Percidae)	Sedation/anesthesia	15 to 330 mg/L (fish) 1:1,000 to 1:20,000 (other poikilotherms)	- Powder is added to water - Concentration depends upon , desired degree of anesthesia, species, size, water temperature and softness, stage of development; preliminary tests of solution should be made with a few fish - 21 day withdrawal time (fish); laboratory or hatchery use only in other poikilotherms - Water temperature over 50° F
	Other aquatic poikilotherms			

Drug	Species	Indication	Dosage regimen	Limitations/Comments
Formalin (Formalin-F® by Natchez Animal Supply Co. & Paracide-F® by Argent Laboratories)	Select finfish: salmon, trout, catfish, bluegill, largemouth bass	Control protozoa (<i>Chilodonella</i> , <i>Costia</i> , <i>Epistylis</i> , <i>Ichthyophthirius</i> , <i>Scyphidia</i> , <i>Trichodina</i> spp.) and monogenetic trematodes (<i>Cleidodiscus</i> , <i>Dactylogyrus</i> , <i>Gyrodactylus</i> spp.)	Tanks and raceways: Salmon & trout Above 50°F: up to 170 µl/L; up to 1 hr Below 50°F: up to 250 µl/L; up to 1 hr Catfish, bluegill, largemouth bass up to 250 µl/L; up to 1 hr Earthen ponds: 15 to 25 µl/L; indefinitely	- Drug must not be subjected to temperature below 40° F - Do not apply to ponds when water is warmer than 80° F, there is a heavy phytoplankton bloom or dissolved oxygen is less than 5 mg/L - Ponds may be retreated in 5 to 10 days if needed —Do not treat ponds containing striped bass.
	Select finfish eggs: salmon, trout, esocid	Control fungi of the family Saprolegniaceae	Select finfish eggs: 1000-2000 ppm for	Preliminary bioassay should be conducted to determine
Formalin (Parasite-S® by Western Chemical,	All finfish	Control protozoa (<i>Chilodonella</i> , <i>Costia</i> , <i>Epistylis</i> , <i>Ichthyophthirius</i> , <i>Scyphidia</i> , <i>Trichodina</i> spp.) and monogenetic trematodes (<i>Cleidodiscus</i> , <i>Dactylogyrus</i> , <i>Gyrodactylus</i> spp.)	Tanks and raceways: Salmon & trout Above 50°F: up to 170 µl/L; up to 1 hr Below 50°F: up to 250 µl/L; up to 1 hr All other finfish up to —250 µl/L; up to 1 hr Earthen ponds: 15 to 25 µl/L; indefinitely	- Drug must not be subjected to temperature below 40° F - Do not apply to ponds when water is warmer than 80° F, there is a heavy phytoplankton bloom, or dissolved oxygen is less than 5 mg/L - Ponds may be retreated in 5 to 10 days if needed - Do not treat ponds containing striped bass
	All finfish eggs	Control fungi of the family Saprolegniaceae	All finfish eggs: 1000-2000 ppm for 15 min.; Acipenseriformes up to 1500 ppm for 15 min.	Preliminary bioassay should be conducted to determine species sensitivity
	Penaeid shrimp	Control protozoan parasites (<i>Bodo</i> , <i>Epistylis</i> and <i>Zoothamnium</i> spp.)	Tanks and raceways: 50 to 100 µl/L, up to and 4 hours daily; Earthen ponds: 25 µl/L; single treatment	- Drug must not be subjected to temperature below 40° F —Do not apply to ponds when water is warmer than 80° F, there is a heavy phytoplankton bloom, or dissolved oxygen is less than 5 mg/L — Ponds may be retreated in 5 to 10 days if needed
Sulfamerazine (by Roche Vitamins, Inc.)	Rainbow, brook, and brown trout	Control furunculosis	- 10 g/100 lb/day for up to 14 days	- In feed - 21 day withdrawal time - Not currently available

Approval applies only to the specific drug which is the subject of a new animal drug application (NADA); active ingredients from other sources (e.g. bulk drug from a chemical company or similar compounds made by companies other than those specified in the NADA) are **not** approved new animal drugs.

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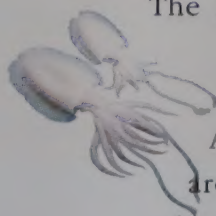
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